

Airfoil selection and computational study on the torque performance of 4-blade vertical axis wind turbine

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ABSTRACT

This paper contains numerically simulated data for a 4-blade Darrieus rotor type vertical axis wind turbine (VAWT). NACA0012, NACA0015, NACA0018 and NACA0021 airfoil types were analysed for the tangential force they create at different angle of attack. Based on the maximum tangential force generated by the airfoil for one full revolution, an airfoil series is selected for designing the 4-blade VAWT in simulation bed using Solid Works and then it is meshed, and cell zones are created over it in ANSYS tool. Then CFD analysis is carried out for different rotational speeds. Considering the overall torque produced during one full revolution, optimal rotational speed is arrived at. Finally, this study is aimed to study the torque performance of 4-blade Darrieus rotor type VAWT. This study is useful for designing the small scale VAWT for meeting the low energy demands at the load centres itself.

KEYWORDS:

Airfoils; Angle of attack; Computational fluid dynamics; Wind turbines